

AMENDMENTS TO THE CLAIMS

This Listing of Claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claim 1. (cancelled)

Claim 2. (currently amended) A The process as claimed in claim 1 for preparing an organically modified aerogel, which comprises

- a) introducing a hydrogel formed at pH greater than 3 as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

wherein a silicatic hydrogel is introduced as initial charge in step a).

Claim 3. (previously presented) A process for preparing an organically modified aerogel, which comprises:

- a) forming a silicatic hydrogel at $\text{pH} \geq 3$;
- b) subjecting the silicatic hydrogel formed in step a), optionally after intermediate treatment steps, to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and
- c) drying the surface modified gel obtained in step b), optionally after additional treatment steps,

wherein the silicatic hydrogel is prepared by bringing an aqueous waterglass solution to a $\text{pH} \leq 3$ with the aid of an acidic ion exchanger resin or a mineral acid, and polycondensing the resulting silicic acid by addition of a base to form an SiO_2 gel.

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Claim 4. (original) The process as claimed in claim 2, wherein the silicatic hydrogel introduced as initial charge in step a) is prepared by obtaining it from an aqueous waterglass solution with the aid of at least one organic and/or inorganic acid via the intermediate stage of a silica sol.

Claim 5. (cancelled)

Claim 6. (previously presented) The process as claimed in claim 2, wherein additives are added before and/or during the preparation of the gel.

Claim 7. (original) The process as claimed in claim 6, wherein additives added are opacifiers and/or fibers.

Claims 8 - 55. (cancelled)

Claim 56. (currently amended) AThe process for producing an organically modified lyogel, which comprises:according to claim 54 or 55,

a) forming a hydrogel at pH > 3;

b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and

c) optionally after additional treatment steps, drying the surface modified gel obtained in step b),

wherein the hydrogel is formed in step a) by lowering the pH of an aqueous waterglass solution.

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Claim 57. (currently amended) AThe process for producing an organically modified lyogel, which comprises: according to claim 55,

- a) forming a hydrogel at pH between pH 3 and pH 8;
- b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and
- c) optionally after additional treatment steps, drying the surface modified gel obtained in step b), wherein the hydrogel is formed in step a) at pH between pH 3 and pH 8 and wherein the pH of an aqueous waterglass solution is lowered in step a) to a pH value not less than 3.

Claim 58. (previously presented) The process according to claim 57 wherein a) a hydrogel is formed by lowering the pH of an aqueous waterglass solution by addition of acid to pH ≥ 8 and establishing the pH between pH 3 and pH 8; b) the hydrogel formed in step a) optionally after intermediate treatment steps, is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and c) the surface modified gel obtained in step b), optionally after additional treatment steps, is dried.

Claim 59. (currently amended) AThe process for producing an organically modified lyogel, which comprises: according to claim 54 or 55,

- a) forming a hydrogel at pH > 3 ;
- b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and
- c) optionally after additional treatment steps, drying the surface modified gel obtained in step b),

wherein the hydrogel is formed in step a) by addition of acid to aqueous waterglass solution and without subsequent addition of base in step a).

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Claims 60-61 (Cancelled)

Claim 62. (previously presented) A process for producing an organically modified aerogel, which comprises:

- a) forming a hydrogel at $\text{pH} > 3$;
 - b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and
 - c) optionally after additional treatment steps, drying the surface modified gel obtained in step b);
- wherein steps a) and b) are carried out as a semi-continuous process, wherein a continuous or semi-continuous stream of acid is mixed with a continuous or semi-continuous stream of aqueous waterglass solution.

Claim 63. (previously presented) The process according to claim 62, wherein the acid stream is admixed with the aqueous waterglass solution through a mixing nozzle.

Claim 64-66. (Cancelled)

Claim 67. (previously presented) The process for producing an organically modified aerogels according to claim 62, wherein the hydrogel is formed in step a) at pH between $\text{pH} 3$ and $\text{pH} 8$.

Claim 68. (previously presented) A process for producing an organically modified aerogels, wherein:

- a) a hydrogel is formed at $\text{pH} \geq 3$;

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b) the hydrogel formed in step a), optionally after intermediate treatment steps, is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and

c) the surface modified gel obtained in step b), optionally after additional treatment steps, is dried;

wherein step a) and b) are carried out as a continuous process and a continuous or semi-continuous stream of acid is mixed with a continuous or semi-continuous stream of aqueous waterglass solution.

Claim 69. (previously presented) The process according to claim 68, wherein the hydrogel is formed in step a) at pH between pH 3 and pH 8.

Claim 70. (cancelled)

Claim 71. (previously presented) The process of claim 3 further comprising washing the gel with water to free it from any electrolyte.

Claims 72-75. (cancelled)

Claim 76. (new) A process for preparing an organically modified aerogel, which comprises:

- a) introducing an inorganic hydrogel formed at pH greater than 3 as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and
- c) drying the surface-modified gel obtained in step b).

Claim 77. (new) The process according to claim 76, wherein the hydrogel obtained in step a) is aged before being surface-modified in step b).

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Claim 78. (new) The process according to claim 76, wherein the hydrogel obtained in step b) is subjected to surface silylation using a silylating agent.

Claim 79. (new) The process as claimed in claim 78, wherein the silylating agent is used in liquid form and/or as a gas or vapor.

Claim 80. (new) The process as claimed in claim 78 or 79, wherein the silylating agent employed comprises at least one silane of the formula $R^1_{4-n}SiCl_n$ or $R^1_{4-n}Si(OR^2)_n$ where $n = 1$ to 4 and where R^1 and R^2 independently of one another are identical or different and are each a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical.

Claim 81. (new) The process as claimed in claim 80, wherein trimethylchlorosilane is employed as silylating agent.

Claim 82. (new) The process as claimed in claim 78 or 79, wherein the silylating agent employed comprises at least one disiloxane of the formula I and/or one disilazane of the formula II



where the radicals independently of one another are identical or different and are each a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical.

Claim 83. (new) The process as claimed in claim 82, wherein the silylating agent employed in step b) is a symmetrical disiloxane.

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Claim 84. (new) The process as claimed in claim 82, wherein the silylating agent employed in step b) is disiloxane in which all radicals R are identical.

Claim 85. (new) The process as claimed in claim 82, wherein the silylating agent employed is hexamethyldisiloxane.

Claim 86. (new) The process as claimed in claim 76, wherein at least one acid and/or base is introduced as initial charge in the hydrogel before surface modification.

Claim 87. (new) The process as claimed in claim 86, wherein HCl is used as acid.

Claim 88. (new) The process as claimed in claim 78, wherein the hydrogel is introduced as initial charge in the silylating agent, and then at least one acid and/or base is added.

Claim 89. (new) The process as claimed in claim 88, wherein HMDSO is used as silylating agent.

Claim 90. (new) The process as claimed in claim 88 or 89, wherein hydrochloric acid is used as acid.

Claim 91. (new) The process as claimed in claim 76, wherein the agent for surface modification is generated shortly before and/or during the surface modification.

Claim 92. (new) The process as claimed in claim 76, wherein the surface modification is accelerated by means of a catalyst.

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Claim 93. (new) The process as claimed in claim 76, wherein at least one carrier gas or carrier gas stream is used in step b) in addition to the agent for surface modification.

Claim 94. (new) The process as claimed in claim 76, wherein some of the water in pores of the hydrogel reacts with the surface modification agent to form a water-insoluble compound.

Claim 95. (new) The process as claimed in claim 94, wherein HMDSO is formed.

Claim 96. (new) The process as claimed in claim 76, wherein an outer surface of the hydrogel is dried prior to surface modification.

Claim 97. (new) A process for preparing an organically modified aerogel, which comprises:

- a) introducing an inorganic hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) to form a surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

wherein an outer surface of the hydrogel is dried by means of at least one gas prior to surface modification.

Claim 98. (new) A process for preparing an organically modified aerogel, which comprises:

- a) introducing an inorganic hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) to form a surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

wherein an outer surface of the hydrogel is dried by means of HCl gas prior to surface modification.

Claim 99. (new) A process for preparing an organically modified aerogel, which comprises:

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- a) introducing an inorganic hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) to form a surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

wherein an outer surface of the hydrogel is dried by means of HMDSO prior to surface modification.

Claim 100. (new) The process as claimed in claim 76, wherein the surface-modified gel is washed with a protic or aprotic solvent prior to step c).

Claim 101. (new) The process as claimed in claim 76, wherein the surface-modified gel is washed with a silylating agent prior to step c).

Claim 102. (new) The process as claimed in claim 76, wherein the surface-modified gel is subjected to subcritical drying in step c).

Claim 103. (new) The process as claimed in claim 76, wherein the gel obtained in step a) is reacted, prior to silylation, with a solution of a condensable orthosilicate of the formula $R^1_4-nSi(OR^2)_n$, where $n = 2$ to 4 and R^1 and R^2 independently of one another are hydrogen atoms or linear or branched C_1 - C_6 -alkyl, cyclohexyl or phenyl radicals, or with an aqueous silicic acid solution.

Claim 104. (new) The process as claimed in claim 76, wherein surface modification is carried out in the presence of additives in the hydrogel.

Claim 105. (new) The process as claimed in claim 104, wherein the additives comprise ionic compounds.

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Claim 106. (new) The process as claimed in claim 104 or 105, wherein the additives comprise opacifiers.

Claim 107. (new) An aerogel produced by

- a) introducing an inorganic hydrogel formed at pH greater than 3 as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and
- c) drying the surface-modified gel obtained in step b) to produce an aerogel,

wherein the aerogel is free from Si-OR groups, where R is a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical.

Claim 108. (new) An inorganic aerogel whose internal surface is covered by at least 90% of the theoretically possible value with organic surface groups which have been applied by surface modification.

Claim 109. (new) The aerogel as claimed in claim 108, which has a degree of coverage of at least 2.6 trimethylsilyl groups per nm².

Claim 110. (new) The aerogel as claimed in claim 107 which comprises additives.

Claim 111. (new) An aerogel as claimed in claim 110, which comprises ionic compounds as additives.

Claim 112. (new) The aerogel as claimed in claim 110, which comprises opacifiers as additives.

Claim 113. (new) The aerogel as claimed in claim 110, which comprises fibers as additives.

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Claim 114. (new) The aerogel as claimed in claim 110, which has a BET internal surface area of less than $600 \text{ m}^2/\text{g}$.

Claim 115. (new) The aerogel as claimed in claim 110, which has a thermal conductivity of $< 12 \text{ mW/mK}$.

Claim 116. (new) The aerogel as claimed in claim 107, which is based on silicate.

Claim 117. (new) Thermal insulation material comprising an aerogel produced by
a) introducing an inorganic hydrogel formed at pH greater than 3 as initial charge,
b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and
c) drying the surface-modified gel obtained in step b) to produce an aerogel,
wherein the aerogel is free from Si-OR groups.

Claim 118. (new) A process for producing an organically modified lyogel, which comprises
a) introducing an inorganic hydrogel formed at pH greater than 3 as initial charge, and
b) subjecting the hydrogel obtained in step (a) to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel.

Claim 119. (new) The lyogel of claim 118, wherein the lyogel is free from Si-OR groups, where R is a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical.

Claim 120. (new) An inorganic lyogel whose internal surface is covered, by at least 90% of the theoretically possible value, with organic surface groups which have been applied by surface modification.

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Claim 121. (new) The lyogel as claimed in claim 119 or 120 which is a hydrogel.

Claim 122. (new) Chromatography media comprising an inorganic lyogel whose internal surface is covered, by at least 90% of the theoretically possible value, with organic surface groups which have been applied by surface modification.

Claim 123. (new) A process for producing an organically modified lyogel, which comprises:

- a) forming an inorganic hydrogel at $\text{pH} > 3$;
- b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and
- c) optionally after additional treatment steps, drying the surface modified gel obtained in step b).

Claim 124. (new) The process according to claim 54, wherein the hydrogel is formed in step a) at pH between $\text{pH} 3$ and $\text{pH} 8$.

Claim 125. (new) The process according to claim 2 in which the silicatic hydrogel comprises zirconium, aluminum, titanium, vanadium and/or iron compounds.

Claim 126. (new) The process according to claim 76, wherein step a) and b) are carried out as a semi-continuous process.

Claim 127. (new) The process according to claim 76, wherein steps a) and b) are carried out as a continuous process.

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Claim 128. (new) The process according to claim 76, wherein step b) results in a hydrophobic gel in a liquid phase substantially immiscible with water, which liquid is separated from an aqueous phase formed by the water from the hydrogel.

Claim 129. (new) A process for preparing an organically modified aerogel, which comprises:

- a) introducing an inorganic hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step (a), and
- c) drying the surface-modified gel obtained in step (b),

wherein the hydrogel obtained in step b) is subjected to surface silylation using a silylating agent comprising at least one silane of the formula $R^1_{4-n}SiCl_n$ or $R^1_{4-n}Si(OR^2)_n$ where $n = 1$ to 4 and where R^1 and R^2 independently of one another are identical or different and are each a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical, wherein the silylating agent comprises at least TMCS and the liquid phase comprises at least HMDSO.

Claim 130. (new) The process according to claim 129 wherein at least a portion of the HMDSO is subsequently recycled.

Claim 131. (new) The process according to claim 129, wherein the silylating agent is used in liquid form or as a gas or vapor.

Claim 132 (new) The process of claim 91, wherein the agent for surface modification is generated shortly before or during the surface modification by means of an acid.

Claim 133. (new) The process of claim 103, wherein the gel obtained in step a) is reacted, prior to silylation, with a solution of an alkyl or aryl orthosilicate.

Claim 134. (new) The process of claim 105, wherein the additives used comprise NaCl.

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Claim 135. (new) The process as claimed in claim 106, wherein the additives used as opacifiers comprise IR opacifiers.

Claim 136. (new) The process as claimed in claim 76 in which the inorganic hydrogel is a silicatic hydrogel.

Claim 137. (new) The process as claimed in claim 97 in which the inorganic hydrogel is a silicatic hydrogel.

Claim 138. (new) The process as claimed in claim 98 in which the inorganic hydrogel is a silicatic hydrogel.

Claim 139. (new) The process as claimed in claim 99 in which the inorganic hydrogel is a silicatic hydrogel.

Claim 140. (new) The aerogel as claimed in claim 107 in which the inorganic hydrogel is a silicatic aerogel.

Claim 141. (new) The inorganic aerogel as claimed in claim 108 in which the inorganic aerogel is a silicatic aerogel

Claim 142. (new) The process as claimed in claim 118 in which the inorganic hydrogel is a silicatic hydrogel.

Claim 143. (new) The inorganic lyogel as claimed in claim 120 in which the inorganic lyogel is a silicatic lyogel.

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Claim 144. (new) The process as claimed in claim 123 in which the inorganic hydrogel is a silicatic hydrogel.

Claim 145. (new) A cosmetic comprising an inorganic lyogel whose internal surface is covered, by at least 90% of the theoretically possible value, with organic surface groups which have been applied by surface modification

Claim 146. (new) A pharmaceutical material comprising an inorganic lyogel whose internal surface is covered, by at least 90% of the theoretically possible value, with organic surface groups which have been applied by surface modification.

Claim 147. (new) The process of claim 56 wherein step a) comprises forming a hydrogel at pH between pH 3 and pH 8.

Claim 128. (new) The process of claim 59 wherein step a) comprises forming a hydrogel at pH between pH 3 and pH 8.

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